# DELAWARE

## Contact Information

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*DNREC Surface Water Quality Management* homepage:
http://www.dnrec.state.de.us/dnrec2000/Divisions/Water/WaterQuality/WQM.htm

## Program Description

Water quality and biological data for Delaware's surface waters are collected under Delaware's Ambient Surface Water Quality Monitoring Program and Biological Monitoring Program within the Delaware Department of Natural Resources and Environmental Control (DNREC). Several active citizen monitoring programs have also been developed throughout Delaware that augment the data collected by DNREC. The purpose of the Ambient Surface Water Quality Monitoring Program is to collect data on the chemical, physical, and biological characteristics of Delaware's surface waters. The information collected under this program is used to:

- Describe general water quality conditions in the State;
- Identify long-term trends in water quality;
- Determine the suitability of Delaware's waters for water supply, recreation, fish and aquatic life, and other uses;
- Monitor achievement of water quality standards;
- Identify and prioritize high quality and degraded waters;
- Support Total Maximum Daily Load Program; and
- Evaluate the overall success of Delaware's water quality management efforts.

DNREC recognizes the need to use its personnel and financial resources efficiently and effectively. To that end, surface water quality monitoring is conducted in a manner that focuses available resources on the Whole Basin Management concept. This program calls for the Department, in partnership with other governmental entities, private interests, and all stakeholders, to focus its resources on specific watersheds and basins (groups of watersheds) within specific time frames. The Whole Basin Management Program in Delaware operates on a 5-year rotating basis. In addition to the planning and preliminary assessment steps, Whole Basin Management will include intensive basin monitoring, comprehensive analyses, management option evaluations, and resource protection strategy development. Public participation and ongoing implementation activities will occur throughout the Whole Basin Management process. This new approach enables DNREC to comprehensively monitor and assess the condition of the State's environment with due consideration to all facets of the ecosystem.

Biological assessment monitoring is one of five major components of Delaware's Surface Water Quality Monitoring Program. The biological monitoring program is a major tool used by the Department to assess the conditions of surface waters. It includes the assessment of indigenous biological communities and physical habitats of streams, ponds, estuaries and wetlands. The goal of the program is to establish numeric biological criteria in State water quality standards to complement both existing chemical criteria and other assessments focused on fish tissue monitoring and bioassay testing. Standard methods have been developed and tested for assessing the biological community and habitat quality of nontidal streams, and draft numeric criteria are under development. Efforts over the next few years will focus on the development of methods for assessing estuaries and ponds and for assessing the quality and quantity of wetlands.

## Documentation and Further Information

*State of Delaware 2000 Watershed Assessment 305(b) Report* and 1998 303(d) List:
http://www.dnrec.state.de.us/water2000/Sections/Watershed/TMDL/305and303.htm

*DE Surface Water Quality Standards*: http://www.dnrec.state.de.us/water/wqs1999.pdf

*State of Delaware Fiscal Year 2000 Surface Water Quality Monitoring Plan*:
http://www.dnrec.state.de.us/dnrec2000/Library/Water/swmonpro.pdf

*Division of Water Resources 2000 Annual Report*: http://www.dnrec.state.de.us/water2000/Public/2000AnnualReport/index.htm

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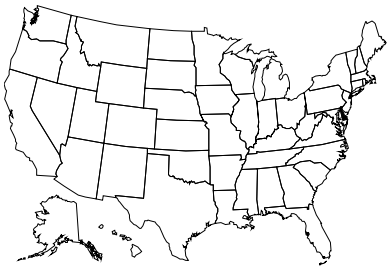

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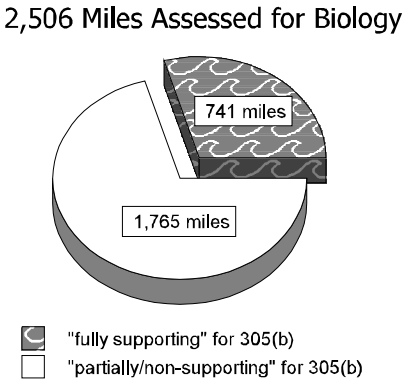
## Programmatic Elements

| | | |
|---|---|---|
| **Uses of bioassessment within overall water quality program** | ✓ | problem identification (screening) |
| | | nonpoint source assessments |
| | ✓ | monitoring the effectiveness of BMPs |
| | | ALU determinations/ambient monitoring |
| | | promulgated into state water quality standards as biocriteria |
| | | support of antidegradation |
| | | evaluation of discharge permit conditions |
| | ✓ | TMDL assessment and monitoring |
| | | other: |
| **Applicable monitoring designs** | ✓ | targeted (i.e., sites selected for specific purpose) *(special projects only)* |
| | ✓ | fixed station (i.e., water quality monitoring stations) *(specific riverbasins or watersheds)* |
| | | probabilistic by stream order/catchment area |
| | | probabilistic by ecoregion, or statewide |
| | | rotating basin |
| | ✓ | other: probabilistic by specific county *(used comprehensively throughout state)* |

## Stream Miles

| | |
|---|---|
| **Total miles** *(determined using RF3)* | **2,506** |
| Total perennial miles | 1,778 |
| **Total miles assessed for biology*** | **2,506** |
| fully supporting for 305(b)* | 741 |
| partially/non-supporting for 305(b)* | 1,765 |
| listed for 303(d)* | 1,173 |
| number of sites sampled *(1991 - 2001)*** | 195 |
| number of miles assessed per site | – |




*All of DE's streams were assessed for the 2000 305(b) Report. These numbers represent the miles assessed for aquatic life support using a combination of physical, chemical, and biological data.

**These sampling stations were EMAP based. Of the 195 total sites sampled, 49 sites have not yet been assessed. Of the 146 sites assessed, 27 are fully supporting and 119 are partially/non-supporting.

## Aquatic Life Use (ALU) Designations and Decision-Making

| | | |
|---|---|---|
| **ALU designation basis** | Single Aquatic Life Use and Warm Water vs. Cold Water | |
| **ALU designations in state water quality standards** | Two designations: 1) Fish, Aquatic Life, and Wildlife; 2) Cold Water Fish | |
| **Narrative Biocriteria in WQS** | none - Procedures used to support general aquatic life statements in WQS are those developed by the Mid Atlantic Coastal Streams (MACS) Workgroup. | |
| **Numeric Biocriteria in WQS** | Draft numeric criteria are under development. | |
| **Uses of bioassessment data in integrated assessments with other environmental data** (e.g., toxicity testing and chemical specific criteria) | ✓ | assessment of aquatic resources |
| | | cause and effect determinations |
| | | permitted discharges |
| | | monitoring (e.g., improvements after mitigation) |
| | | watershed based management |
| **Uses of bioassessment/ biocriteria in making management decisions regarding restoration of aquatic resources to a designated ALU** | Some streams have been placed on the State's 303(d) list for poor biology/habitat. | |

## Reference Site/Condition Development

| | | |
|---|---|---|
| **Number of reference sites** | **13 total** | |
| **Reference site determinations** | | site-specific |
| | | paired watersheds |
| | ✓ | regional (aggregate of sites) |
| | ✓ | professional judgment |
| | | other: |
| **Reference site criteria** | Least impacted, land use, habitat score >110 out of 140, no point source discharge, no known direct discharge from animal feedlots or urban runoff, professional judgment. | |
| **Characterization of reference sites within a regional context** | | historical conditions |
| | ✓ | least disturbed sites |
| | | gradient response |
| | | professional judgment |
| | | other: |
| **Stream stratification within regional reference conditions** | ✓ | ecoregions (or some aggregate) |
| | | elevation |
| | | stream type |
| | | multivariate grouping |
| | | jurisdictional (i.e., statewide) |
| | | other: |
| **Additional information** | | reference sites linked to ALU |
| | | reference sites/condition referenced in water quality standards |
| | ✓ | some reference sites represent acceptable human-induced conditions |

## Field and Lab Methods

| | | |
|---|---|---|
| **Assemblages assessed** | ✓ | benthos *(<100 samples/year; single season, multiple sites - broad coverage)* |
| | | fish |
| | | periphyton |
| | | other: |
| **Benthos** | | |
| sampling gear | | D-frame and kick net (1 meter); 500-600 micron mesh |
| habitat selection | | riffle/run (cobble) in Piedmont ecoregion, and multihabitat in Coastal Plain ecoregion |
| subsample size | | 200 count |
| taxonomy | | genus |
| **Habitat assessments** | | visual based; performed with bioassessments |
| **Quality assurance program elements** | | standard operating procedures, periodic meetings and training for biologists, sorting proficiency checks, specimen archival, and a QAPP for biological work is under development |

## Data Analysis and Interpretation

| | | |
|---|---|---|
| **Data analysis tools and methods** | | summary tables, illustrative graphs |
| | | parametric ANOVAs |
| | | multivariate analysis |
| | ✓ | biological metrics *(aggregate metrics into an index)* |
| | | disturbance gradients |
| | | other: |
| **Multimetric thresholds** | | |
| transforming metrics into unitless scores | | 95$^{th}$ percentile of all sites |
| defining impairment in a multimetric index | | < 67% of reference is impaired to some degree |
| **Evaluation of performance characteristics** | ✓ | repeat sampling *(replicate samples are collected at every 10 sites by the same team, at the same reach or an adjacent reach)* |
| | | precision |
| | | sensitivity |
| | | bias |
| | | accuracy |
| **Biological data** | | |
| Storage | | MS Access and Excel |
| Retrieval and analysis | | Excel |